July 12, 1938. A. GAGNÉ 2,123,551

LATCH OPENER

Filed April 2, 1936

FIG. 1.

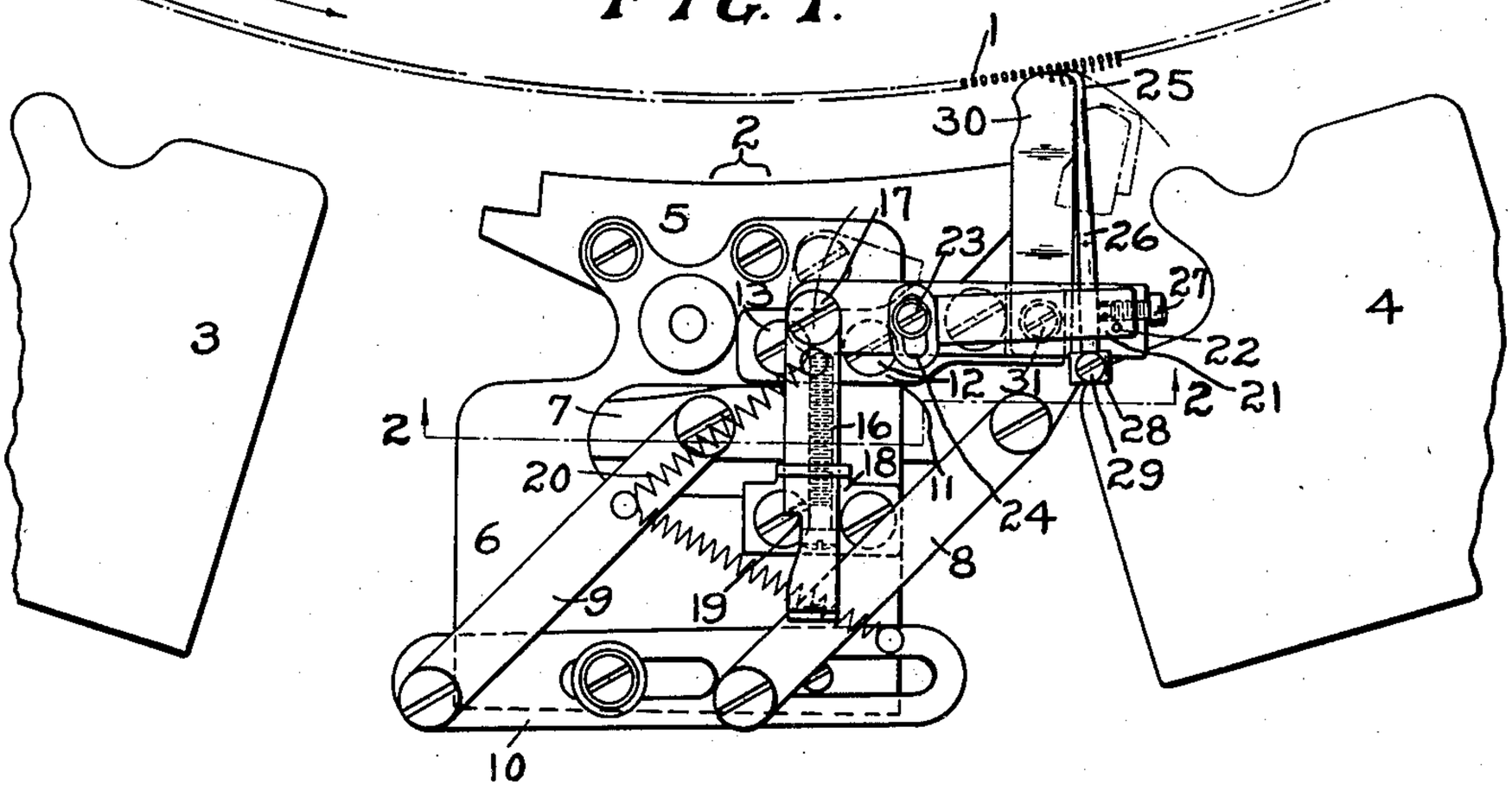


FIG. 2.

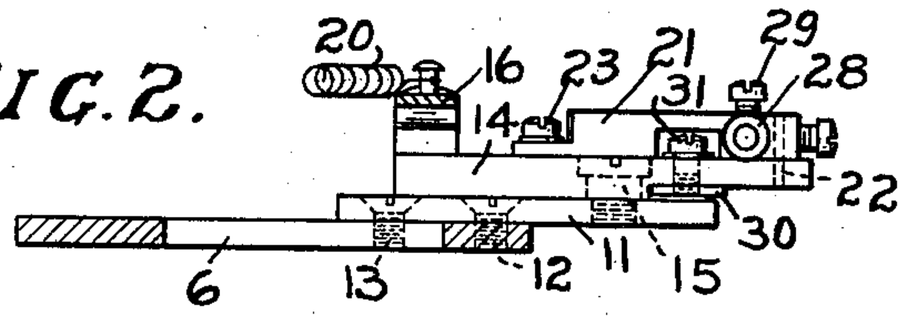


FIG. 4.

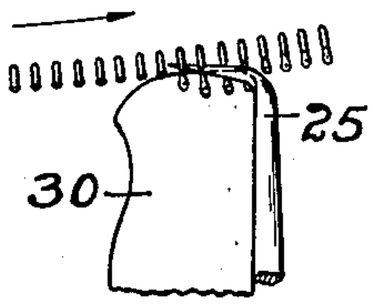


FIG. 3.

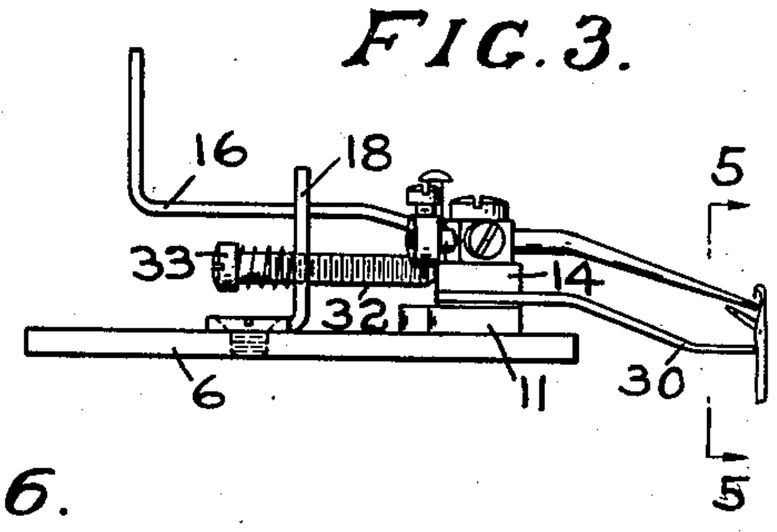


FIG. 5.

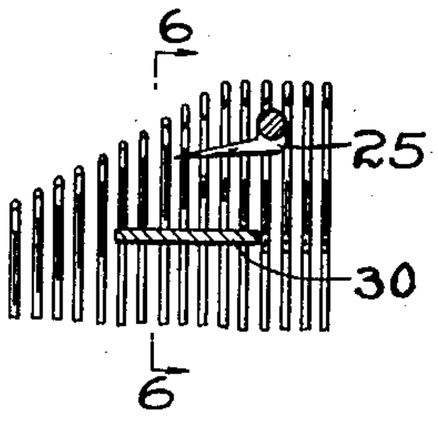
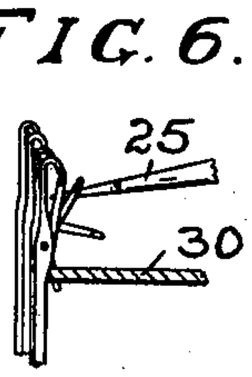


FIG. 6.



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Patented July 12, 1938

2,123,551

UNITED STATES PATENT OFFICE

2,123,551

LATCH OPENER

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Application April 2, 1936, Serial No. 72,342

5 Claims. (Cl. 66—111)

The present case has for an object the provision of means for opening latches of latch needles in knitting machines without any possibility of destruction to the latches or needles, or failure to perform the latch opening function whenever the same shall be necessary. This latch opener may be employed with any type of knitting machine such as hosiery machines, multi-feed machines, double cylinder machines or the like, and is especially adapted for all machines employing fine gauge latch needles, the function of opening latches on such needles being a very delicate one and one in which the mechanism must be practically perfect in its operation to avoid knitting defective material.

In the drawing:

Fig. 1 is a plan showing the new form of latch opener applied to one feed of a multi-feed knitting machine, it being understood that as many latch openers as are necessary are to be employed about the machine.

Fig. 2 is a section showing in detail many of the parts of the opener.

Fig. 3 is an elevation showing the manner in which the latch opener engages needles for aligning them and for controlling their latches.

Fig. 4 is a view in plan, much enlarged, showing the needle engaging instrumentalities performing their function.

Fig. 5 is a section taken on line **5—5**, Fig. 3; and

Fig. 6 is a section taken on line **6—6**, Fig. 5.

In latch needle knitting machines there are certain instances where peculiar operation of the machine allows the needle latches to close and wherein the stitch last taken by the needle will not function at the proper time to open the latches thus making it necessary to provide a special mechanism for opening them. One example of a case wherein needle latches must be specially manipulated is that occurring when making so-called perforated or open work fabric in which eyelet holes are produced by dropping stitches from certain needles. Such a practice may be employed on multi-feed machines especially in producing fine gauge fabric, and certain spaced needles are to be selected to fail to take yarn at one or more courses and to cast off their stitches, these needles functioning without any stitches thereon or without taking any yarn for one or more feeds. The latches of these needles which cast off loops are naturally subject to being closed and if they are closed, will not take yarn and knit properly at the first feed at which they are supposed to. This is one example of a method of knitting in which the latch opener herein disclosed would be advantageously used.

In knitting certain fabrics, for example hosiery in which an elastic yarn is to be incorporated, this elastic yarn will preferably be inserted at a position somewhat removed from the main yarn feeding point. At that particular position needle latches may not be open and the use of such a latch opener as this case deals with is anticipated during such knitting. These are merely examples of certain instances wherein the latch opener may be used to advantage but I do not limit the uses of the device in any particular way since it is perfectly adapted for use on all latch needle knitting machines of coarse or fine gauge.

When using the latch opener for such purposes, it will be necessary to project the opener to active position and to withdraw it from that position at predetermined intervals. For this purpose I employ a mechanical connection to any suitable part of the machine such as the main cam shaft or any auxiliary pattern mechanism functioning in timed relation thereto. When knitting rubber within the welt of a stocking or the like, this pattern control will cause the latch opener to be swung into an engagement with the needles as the rubber yarn is inserted and to be withdrawn when knitting of that rubber yarn is discontinued.

Now referring to the figures of the drawing I will describe the mechanism as it has been applied to one specific type of machine. A fragment of a multi-feed knitting machine has been illustrated in Fig. 1, a group of needles illustrated by numeral **1**, and one feed of the machine being represented at **2** while adjacent feeds are only diagrammatically indicated at **3** and **4**. At the feeding station indicated at **2** a sinker cam **5** is attached to plate **6** and another sinker controlling cam **7** is pivotally movable on arms **8** and **9** each attached to the sliding, adjustable piece **10** fixed to the said plate. At one corner of this plate **6** I have attached the latch opener it being understood that the particular latch opener illustrated would function to open latches for the next feed **4** at which the needles would take yarn and draw stitches. It is obvious that the latch opener may be mounted upon other convenient parts of the machine or may be attached to a support provided expressly for the purpose of carrying latch openers. It may be that only one of these openers will be required for some particular machines and for some particular knitting problems, however, one may be attached at each feeding

station or at spaced feeding stations as necessary.

Now referring to Figs. 1, 2 and 3, Fig. 2 being a section taken on the line 2—2, Fig. 1, the plate 6 has an extension 11 attached thereto at one corner by means of the screws 12 and 13 or by any other suitable connecting means. A short rectangular piece 14 is pivoted at about its mid-position on the shouldered screw 15 which has the top of its head arranged flush with the top of the piece 14 and is threaded into extension 11. This piece 14 has a controlling arm or latch 16 pivoted thereto at 17 which latch extends through an angular piece 18 having a slot therein adjacent its upper end. This angular piece 18 attaches to the plate 6 by means of suitable screws. The latch 16 has a notch 19 which as shown in Fig. 1, is unaffected by the angular element 18 but which will catch in that element as the latch is pushed inwardly and will lock the latch opener in an inactive position as shown by the dot and dash lines, Fig. 1. A spring 20 is attached to some fixed part of the supporting structure close by the latch and also to the latch to assure that the notch will engage at the side of the slot when pushed inwardly, and that the elements can not accidentally move to an operative position.

An element 21 is fixed to swivel about a pin 22 which projects through both elements 21 and 14 being free to turn in either one or the other and is held in a properly adjusted position by means of locking screw 23. This locking screw passes through the end of element 21 which has been slotted as illustrated at 24 thus giving a convenient range of adjustment for the latch opening hook 25 which is formed at the end of a tapering rod 26 held in the end of element 21 by means of a set screw 27. This rod 26 having its end bent and sharpened into the latch opening point 25 has a collar 28 attached thereto by means of a screw 29 merely for purposes of providing a convenient attachment for gripping that end of the opener while moving the same inwardly or outwardly or turning it about its axis for purposes of adjustment. Once the opener has been set to the proper position set screw 27 will be tightened to maintain it in that position. It can be seen that the point 25 is adjustable to practically any desired position for engaging needle latches by its movement just described and by the adjustment of element 21 by means of locking screw 23 and slot 24.

The hook 25 will open latches in a known manner as illustrated in Figs. 4, 5, and 6, such hooks being more or less successful when employed with coarse gauge machines. In fine gauge machines wherein the needles are subject to misalignment and wherein the hook must engage within the extremely small space between a closed latch and the inside of the needle shank beneath the hook there is a very definite hazard due to the fact that said hook may engage in back of the needle itself thus causing considerable damage to the machine. It is also quite probable that such a hook would not always engage needle latches in the event some needles were forced to the back of their slots and wherein the hook could not be set quite as far inwardly as it should be due to trying to avoid the hazard of catching behind the needles themselves. Of course, if the opener does not open all those latches which it is necessary to open, imperfect fabric will be knitted, and if very many latches escaped unopened, or if the opener were to engage even an occasional needle now and then to cause a smash the device would be useless for any practical purposes.

To overcome the difficulties above outlined I have provided a needle aligning element 30 attached by means of a screw 31 to the swiveling piece 14. This needle aligning instrument 30 has a rounded end which engages the needles as they pass by and forces them to pass the opener at a position in which it is assured that the point 25 will catch the latches to open them but can not possibly engage the needle itself. As illustrated in Fig. 4 this needle aligning member engages needles slightly in front of the opener and maintains them in alignment while they are passing the hook of the opener.

The needle aligning instrument may be adjusted as to the degree of force it will exert upon needle shanks passing by means of screw 32 threaded within the angular piece 18 and maintained in an adjusted position by means of spring 33. Whenever the entire assembly is moved to the dot and dash line, Fig. 1, as it would be whenever there is no necessity for opening needle latches, it may merely be released by releasing notch 19 from the side of the slot and allowing the opener to swing into position against the needles under the influence of tension spring 20. Screw 32 provides a definite stop to assure that the opener will engage needles properly as it did when removed from position. This device is very simple in its construction, has practically no tendency to get out of proper operating adjustment and will perform the latch opening function very effectively without imposing the hazard of destroying needles or other parts of the machine in the event of improper engagement between the opener and needles.

While the invention has been described in more or less specific terms it is not intended that any limitation be imposed thereby, but this disclosure is given to illustrate one practical embodiment of the invention claimed in the appended claims.

I claim:

1. In a knitting machine, a needle bed, latch needles maintained in said bed, a latch opener having in combination a latch engaging and opening instrumentality and means for acting upon needles and pressing against their hook sides to maintain them in alignment as they engage and pass the opening instrumentality.

2. In a knitting machine, a needle bed, latch needles maintained in said bed, a latch opener including in combination a hook-like instrument for engaging needle latches and causing them to be opened and means functioning upon the shanks of needles beneath their latches and at the hook sides thereof, for maintaining them in substantial alignment as they pass the point of said hook-like instrument whereby all latches will be engaged without danger of engaging needle hooks themselves.

3. In a knitting machine, a needle bed, slots in said bed and latch needles operably maintained within said slots, a latch opener including in combination a latch engaging and opening instrument and a needle aligning instrument functioning beneath said latch opener and at the same side of said needles, said aligning instrument being constructed to force needles back within their slots to a position wherein latches only may be engaged by the said opener.

4. In a knitting machine, a needle bed, latch needles maintained within said bed, a latch opener for knitting machine including in combination a support, a latch opener independently and

adjustably mounted on said support, needle aligning means adjustably attached to said support and constructed to engage the hook sides of needles below their latches and to maintain them in alignment as said needles approach the opener and during their travel past the same, and means for simultaneously moving said opener and aligning means into and from operative engagement with needles.

5. In a knitting machine, a needle bed, latch needles maintained in said bed, a latch opener including in combination a latch engaging and opening instrument and a needle aligning instrument, a common support for said opening and aligning instruments, said instruments being mounted at the same side of the said needles and constructed so that the aligning instrument presses against the hook sides of the needles for the purpose described.

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